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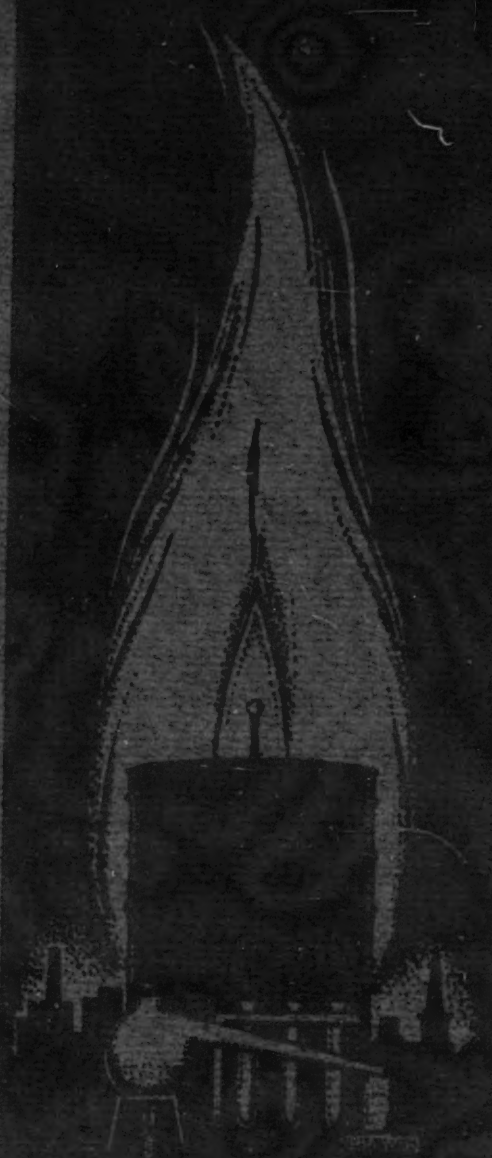

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GAS ABSTRACTS

With this issue GAS ABSTRACTS enters its second year of publication. Inaugurated in 1945 as a service to the Gas Industry by the Institute of Gas Technology, GAS ABSTRACTS, which is published monthly, consists of abstracts of papers appearing in current technical journals in the field of gas technology and related subjects.

SCOPE OF SELECTION: Articles, papers, and books, both theoretical and applied, pertaining to the manufacture, distribution or utilization of natural and manufactured gas will be considered. The periodicals listed on the last two pages will be read regularly. For the time being, only abstracts of those articles which are of immediate interest to our own staff, with a consideration of the interests of research and development men in the industry as a whole, will be considered.

METHOD OF ABSTRACTING: For the most part, the abstracting is done by the research staff of the Institute of Gas Technology. It is intended, in general, that the abstracts supply the technical man with sufficient information to enable him to determine the desirability of reading the entire paper. For some articles which seem of unusual value a more detailed summary will be made.

CLASSIFICATION OF ABSTRACTS: The abstracts are grouped together in twelve subject groups and are arranged alphabetically by subject in each group. These subject groups and pages on which the abstracts appear are listed in the Table of Contents.

ANNUAL INDEX: Author and subject indices will be issued at the end of the year.

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I. THE GAS INDUSTRY

GAS RESEARCH

Noppel, E.P. NEW HORIZONS FOR GAS RESEARCH. *Amer. Gas. Assoc. Monthly* 27, *533-534 (1945) December.*

A progress report on the utilization and general technical research undertaken by the gas industry as a part of the record development program currently under way.

--Editor's Abstract

LP-GAS

CONSOLIDATED EDISON INSTALLS LP-GAS PLANT TO MEET "PEAK" DEMANDS. *Amer. Gas Assoc. Monthly* 27, *545 (1945) December.*

Consolidated Edison Company of New York, Inc., is now increasing its gas manufacturing facilities by 10,000,000 cubic feet of gas a day by installing a propane or liquefied petroleum gas plant for emergency or "peak" demands. The installation, consisting of fourteen 25,000 gallon storage tanks, is being made at the company's Hunts Point plant in the lower Bronx.

--Excerpt from article

LP-GAS INDUSTRY

Dotterweich, F.H. RESULTS OF THE 1945 LP-GAS INDUSTRY SURVEY. *LP-Gas* 5, *13-16 (1945) December.*

The use of the separate fractions and mixtures of propane and butane has developed more rapidly than that of any other petroleum product. During the war period, because an ever increasing quantity of LP-Gas was required not only as fuel but also as raw material in the production of aviation fuel, synthetic rubber and chemicals, this increase in use was greatly accelerated. Tables showing monthly and total production of LP gases for 1944 and 1945 and a table showing the production and disposition of LP gases for the same period are included.

--L.J. Willien

LP-GAS INDUSTRY

Drake, F.E. LP-GAS, ITS RELATION TO THE MANUFACTURED GAS INDUSTRY. *Gas Age* 96, *15-17 (1945) November 29; Amer. Gas J.* 163, *11-15 (1945) December.*

Approximately a billion gallons of LP-gas was sold in 1944. Of this amount about 5% was used for gas manufacturing, 44% for domestic purposes, 16% as industrial fuel and the balance for synthetic rubber components, chemical manufacturing, internal combustion engine fuel and other uses. There is money in the bottled gas business which is within the jurisdiction of the gas man. The gas industry has missed a great market by not utilizing it more fully to hold adjacent territory until main extensions can be justified. Many other uses of LP-gas by the Gas Industry are discussed.

--L.J. Willien

I. THE GAS INDUSTRY

LP-GAS INSTITUTE

NATIONAL LP-GAS INSTITUTE TO OPEN IN TULSA (OKLAHOMA). *LP-Gas* 5, 48 (1945) *December.*

RESEARCH

RESEARCH FOR INDUSTRY FOUNDED IN ST. LOUIS. *Oil, Paint and Drug Reporter* 148, 7 (1945) *December* 3.

An industrial research foundation has been established at Washington University, St. Louis, by a directorate representing eight industrial concerns in that area. The foundation, which will utilize the facilities of the university's school of Engineering under Dean Alexander S. Langdorf, will undertake projects related to fundamental scientific principles as well as practical problems initiated and financed by industry. Among the nine directors of the foundation are two executives of the Monsanto Chemical Company, Edgar M. Queen and Paul G. Marsh.

--Excerpt from article

RESEARCH

KILGORE PROPOSES 'COMPROMISE' SCIENTIFIC RESEARCH BILL. *Natl. Petroleum News* 37, 14 (1945) *December 26.*

Seeking to end controversy over proposed establishment of a national science foundation, the Senate War Mobilization (Kilgore) Subcommittee has come up with new version of legislation designed to effectuate a permanent scientific research program. The subcommittee proposed inclusion of specific language showing the intent of Congress that scientific freedom and initiative be safeguarded, provision that all officers and employes of the foundation be selected on a non-political basis, provision for constant scrutiny of the foundation's work by the public and, particularly, by the nation's scientists, placement of final responsibility on fulltime government officials, and encouragement of widespread initiative through an automatic formula for distribution of a minimum proportion of the total research funds among the several states.

--Excerpt from article

RESEARCH

CHEMICAL ENGINEERS HIT KILGORE BILL AS PATENT SYSTEM FOE. *Natl. Petroleum News* 37, 14 (1945) *December 26.*

Approval of science legislation of the type fostered by the Magnuson bill was voted by the American Institute of Chemical Engineers at its 38th annual meeting held in Chicago Dec. 16-19. S.L. Tyler, secretary of the institute, said: "The Magnuson bill is legislation for science only; it contains nothing harmful to the patent system. The Kilgore bill, which is also under consideration as a possible law, is the antithesis of the type of legislation we have approved. It contains patent features which are inimical to the best interests of the United States as it removes from industry the protection of patents. Basic research cannot be

utilized and expanded without the protection of patents, and the Kilgore bill, under the guise of science legislation, efficiently negates this protection. Progress in all industry, not only in the chemical branch, would be stopped."

--Excerpt from article

2. APPLIANCES

BURNERS

Fortis, O. (to Automatic Burner Corp.). BURNER. *U.S. 2,386,848 October 16, 1945.*

Range burner has an improved gas manifold in the bottom of a tubular burner which permits liquid or gas fuel to be burned without special adjustment when changing from one type of fuel to another.

BURNERS

Fuller, W.D. (to Selas Corp. of America). BURNERS. *U.S. 2,384,022 September 4, 1945*

A gas burner includes refractory material disposed in a novel manner alongside the burner composition space which is highly heated to incandescence by the combustion process and serves as a high temperature source of radiant heat.

ROLL WARMER

GAS-FIRED ROLL WARMER AVAILABLE. *Amer. Gas Assoc. Monthly* 27, 556 *(1945) December.*

Now available as an early postwar kitchen accessory is the Atlas gas fired roll warmer made by the National Cornice Works, Los Angeles, California. This gas fired roll warmer is an attractive piece of equipment in stainless steel with copper lined drawers and is especially designed to keep hard rolls hard and soft rolls soft by means of a damper located in the top of the well in which the drawers slide. Heated by a special gas burner which burns up through a nichrome wire screen to facilitate complete combustion, the roll warmer will pay dividends in increased patron satisfaction. It is made in two and three drawer models for either counter or floor installation.

--Excerpt from article

STOVE TOP ENAMEL

Fellows, R.L. CRAZING OF ENAMEL ON STOVE TOPS DUE TO HEATING IN SERVICE. *J. Amer. Ceramic Soc.* 28, *275-281 (1945) October 1.*

Stove tops show two types of crazing: That due to thermal shock and that due to flexing of the stove top from localized heating. This article concerns crazing of the latter type. The amount of flexing required to cause failure decreases with temperature. Failure occurs below 550° F. Sample plates from various tests were studied. The factors that influenced crazing are as follows: (1) The amount of tensile strain on the enamel due to fabrication or assembly. (2) The degree of coefficient of expansion of the enamel cover coat. (3) The amount of enamel applied on the stove top. (4) The gauge of the base metal. (5) The length of time the enamel is heated.

--S. Mori

3. COAL AND GASIFICATION

CARBURETTED WATER GAS

Schlegel, C.A. DEVELOPMENTS IN CARBURETTED WATER GAS. *Amer. Gas J.* 163, 27 *(1945) November.*

The capacity of many existing water gas plants can be increased considerably at lower cost than new plant additions by certain adjustments such as the use of a larger capacity blower and a shorter cycle. Further additions to capacity can be secured by the installation of available new equipment of the latest and most efficient design for use as base load equipment, releasing older equipment for peak load capacity. The most important improvements in gas production apparatus during the last 20 years is the mechanical or self clinkering water gas generator with automatic fuel charger and automatic control machine. The water jacketed section of the generator prevents the adhesion of clinker to the side walls of the generator, and produces about one-third of the amount of steam required for the water gas reaction. The original 4000 MCF daily capacity of 11 ft. hand clinkered generators, operated with coke and gas oil, has been increased to 6000 MCF per day by the use of heavy oil and minor changes. In comparison, the 11 ft. sets of the latest design yield over 9000 MCF per day with the use of heavy oil and coke, in addition to savings in labor costs and other advantages. The automatic charging alone increased the daily capacity by 7-10%. The perforated carburettor lining, connected by air flues to the air blower system, renders the removal of carbon easy and permits the use of lower priced fuel oils for gas enrichment. The use of raw refinery oil gas, reformed and enriched to produce city gas, has lowered the production cost considerably in case of plants located close to oil refineries. This process is adaptable to the use of liquified petroleum products for peak load requirements. The investment cost of a modern water gas plant, with a spare exhauster and steam boiler, built in 1941, was about $68 per MCF of daily capacity.

--J.J. Sebastian

COAL - COMBUSTION

Hammond, E.S. (to Blaw-Knox Co.). COMBUSTION OF COAL. *U.S. 2,385,508 September 25, 1945.*

Finely ground coal is suspended in steam and conveyed to burner as a suspension.

COAL MINING

NAZIS USED COAL PLANERS TO MEET WARTIME NEEDS. *Gas Age* 96, 30 *(1945) November 1.*

Bureau of Mines investigation reports the use of a coal mining machine of advanced design which is capable of mining 800 tons per day.

--G.D. Creelman

3. COAL AND GASIFICATION

GASIFICATION

Gibson, J.W. A SCOTTISH TOTAL GASIFICATION PLANT. *Gas Times* 45, 29-30 (1945) *November 24.*

In the design of this plant the following factors have been taken into consideration. (1) Simplicity in design and operation details. (2) Flexibility in gas production. (3) Flexibility to allow for gasification of varying qualities of fuel. (4) Carburetting in the fuel bed proper without the necessity of a carburettor; and superheater utilizing own product tar. The plant consists of a retort superimposed upon a water gas generator in such a way that the blow gases pass through an annulus surrounding the retort and are burned in a waste heat boiler which provides the steam for the plant. The waste gases are then conducted through a chamber for preheating the enrichment medium before passing to the atmosphere. This makes for high thermal efficiency, as practically every available Btu is extracted from the waste gases. The plant operates automatically. It has been found that variations which caused the greatest interferences in the working of gasification plants were those affecting the temperature of the gases leaving the outlet of the generator. No operating results are given.

—L.J. Willien

GAS PRODUCTION

SYNTHETIC FUEL LABORATORY AT WEST VIRGINIA. *Chem. Eng. News* 23, 2100 (1945) *November 25.*

A new laboratory and research unit where the Bureau of Mines will conduct experiments in the production of gases required in the manufacture of synthetic liquid fuel from coal will be established soon on the campus of West Virginia University, Morgantown. Under a cooperative agreement between the bureau and the university a research program involving about $100,000 annually will be initiated. Laboratories will be provided by the university and staffed with bureau personnel.

--Excerpt from article

GAS PRODUCTION

SYNTHETIC GAS FROM COAL. *Bituminous Coal Research* 5, 12 (1945) *October-December.*

The University of Michigan has developed a process for making synthetic methane by showering down finely crushed coal into a hot furnace through one-way feeder valves. Hot air and steam are blasted in at the bottom producing blue water gas. Subsequently, the water gas is changed into methane under high pressure and in the presence of a catalyst of nickel or metallic oxide.

--Complete item

4. NATURAL GAS

RECOVERY

Nelly, H.M. Jr., and Canfield, R.W. WORLD'S LARGEST HIGH PRESSURE RECOVERY PLANT HANDLES 350,000,000 CUBIC FEET DAILY. *World Petroleum* 16, 52-54 (1945) *October.*

Recently J.F. Prichard and Company have designed, constructed, and put into operation for the J.S. Abercrombie Company and the Magnolia Petroleum Company, a high pressure absorption plant that handles 350,000,000 cubic feet of wet gas per day. The plant is located in the Old Ocean Field, near Sweeny, Texas. When plants of this type were first installed, the high pressure distillate was flowed into high pressure separators where the light oil or distillate was separated and the gases used or compressed back into the formation. Most of the separators in these plants were operated in the retrograde condensation range, above 1100 pounds per square inch, and the considerable amounts of pentane and heavy materials remained in the exit gas. The J.S. Abercrombie Company and the Magnolia Petroleum Company plant recovers 90 per cent of the normal butane and substantially 100 per cent of the isopentane and heavy material. Propane, isobutane, normal butane, isopentane and de-isopentanized gasoline are produced from the heavy material. In order to avoid loss of these valuable constituents while absorbing in the retrograde condensation range, a heavy high molecular weight lean oil having an initial boiling point between 450° and 500° F is used. The wet gas enters the plant at pressures ranging up to 2250 pounds per square inch; it is processed and then either sold or returned to the producing formation at 3700 pounds per square inch. A double lean oil system is used; 80,000 barrels of oil are circulated per day. Cooling water is used at the rate of 17,000 gallons per minute. A systematic flow diagram for the plant is given.

--E.R. Strong

RESERVES

ERATH CYCLING PLANT HANDLES BIG VOLUME OF GAS CONDENSATE. *World Petroleum* 16, *50-53 (1945) December.*

The Erath field, located in south central Louisiana, is one of the major gas-condensate reserves of the Gulf Coast, and has contributed substantial quantities of butanes and isopentanes for the war time 100-octane gasoline program. In its organization as a unitized project and in the use that has been made of advanced methods of production, it is an outstanding example of skilled engineering applied to a condensate field.

--Editor's Abstract

UTILIZATION

Louisiana Natural Gas Conservation Committee. NATURAL GAS USES. *Baton Rouge, November 12, 1945.*

A bibliography, arranged according to author, of uses of natural gas for purposes other than heating.

UTILIZATION

Oberfell, G.G. UTILIZATION OF NATURAL GAS IN THE UNITED STATES. *Oil Gas J.* 44, 76-78 *(1945) December 15.*

This is a condensed summary of the paper presented before the Chicago Section, American Institute of Mining and Metallurgical Engineers, December 5. An examination of the past and present uses of natural gas, the author concludes, clearly indicates its superior qualities for fuel purposes. While considerable quantities are employed in carbon-black plants, nevertheless such use disappears when higher-priced markets and pipe-line outlets become available. The future prospects for the use of natural gas for fuel purposes is very bright. Natural gas as a raw material in the manufacture of chemicals is of considerable economic importance to the chemical industry, but the quantity of natural gas used for producing chemicals is and probably will continue to be relatively small in comparison to the amount used for other purposes. Natural gas is a more economic raw material than coal for conversion to liquid hydrocarbons by the Fischer-Tropsch process. Modifications of the Fischer-Tropsch process, using natural gas, will undoubtedly find useful applications, particularly where the process can be combined with other processes or with existing facilities. The production of natural gasoline and the manufacture of chemicals afford opportunities for such combinations. However, without the economic advantages of such combinations, the available information indicates that as a means of producing gasoline alone the Fischer-Tropsch process would not be competitive with present refinery operations, using crude oil as a raw material, under present prices. Furthermore, the peak of gasoline production from natural gas by the Fischer-Tropsch process will undoubtedly amount to only a minor proportion of the total gasoline supply of the nation.

--Author's Abstract

5. FUELS AND COMBUSTION

SYNTHETIC FUELS

'GAS' AND 'OIL' FROM COAL DEMONSTRATION PLANT SET. *Oil, Paint and Drug Reporter* 148, 7 *(1945) December 3;* Also in *Natl. Petroleum News* 37, 34 *(1945) November 28.*

The Bureau of Mines will take over the Missouri Ordnance Works, near Louisiana, Mo., a plant that made synthetic ammonia during the war, and convert it into a demonstration plant for the production of gasoline and oil from coal and lignite, Secretary of the Interior Harold L. Ickes has announced. The Bureau of Mines plans call for two distinct units, one using the direct hydrogenation method of producing synthetic fuels and the other employing the indirect gas synthesis process, Secretary Ickes said. Approximately nine months will be required for completion of the design work and another nine months for the construction of the hydrogenation unit, which will be undertaken first. Two processes now in use for converting coal or lignite to liquid fuels will be adapted to American raw materials at Bruceton and Louisiana. The first, a direct hydrogenation process, is employed in both Germany and England.

--Excerpt from article

SYNTHETIC FUELS

SEEK COAL HYDROGENATION PLANT FOR SYNTHETIC FUELS PROGRAM. *Natl. Petroleum News* 37, *34 (1945) November 28.*

A semi-commercial or fully commercial coal hydrogenation plant is being sought for New Mexico as part of the Bureau of Mines Synthetic Liquid Fuels Program, under which up to $30,000,000 is to be spent over five years to develop means to produce liquid fuels from coal, oil shales, and agricultural and forestry products. New Mexico interests are asking that, through the next appropriation under this law, funds be allocated to build at least a 1000-bbl. plant within its borders. The vast reserves of highly volatile bituminous and semi-bituminous coal in New Mexico and the proximity of large additional reserves in Utah and Colorado together with the strategic location of the state, make it a desirable point for coal hydrogenation operations, it is pointed out.

--Excerpt from article

SYNTHETIC FUELS

SYNTHETIC LIQUID FUELS. *Amer. Gas J.* 163, *28 (1945) December.*

"High-spot" review of German methods of making synthetic fuel.

6. PETROLEUM

BUTADIENE

Ralph, H.D. PETROLEUM TO SUPPLY ALL BUTADIENE NEXT YEAR. *Oil Gas J.* 44, 70-72 (1945) December 15.

PETROLEUM INDUSTRY

Harrington, P.J., Bragg, B.L., III, Rhys, C.O., Jr. NO PEACE FOR FRACTIONATORS. *Natl. Petroleum News, Tech. Sect.* 37, R-965-969 (1945) December 5.

PETROLEUM REFINING - CATALYTIC CRACKING

Anderson, N.K. and Sterba, M.J. SIMPLIFIED CATALYTIC CRACKING UNIT MEETS REQUIREMENTS OF SMALLER REFINERS. *Oil Gas J.* 44, 77-80, 84, 86 (1945) December 22.

A smaller-capacity catalytic cracking unit has been designed for the use of the smaller-capacity refinery, the details based on experience in building and operating wartime Fluid units. This plant operates at temperatures ranging from 800° to 1000°F., on stocks ranging from naphthas to topped crudes, fed to the catalyst section without preflashing. Mechanical design is simplified greatly by placing the regenerator immediately above the reactor, in the same column. Microspherical form of catalyst is used in the new adaptation of the Fluid process. Yields of 45 to 53 per cent gasoline are obtained, showing octane ratings of 79 to 82 (A.S.T.M.) and 89 to 93 (CFR-Research). Operating costs vary from 23.8 cents per barrel of charge for a 4,500 bbl. unit with natural catalyst to 44.0 cents per barrel of charge for a 900 bbl. per day unit with silica-magnesia or silica-alumina synthetic catalyst.

--Author's abstract

PETROLEUM REFINING - FLUID CATALYTIC CRACKING

NEW 1000 B/D CATALYTIC CRACKER OPERATES ON FLUID PRINCIPLE. *Natl. Petroleum News* 37, 939-943 (1945) December 5.

Small scale catalytic operation on a basis economically comparable with two-coil thermal cracking is claimed by Universal Oil Products for its new M-S Type unit, details of which are given. The unit operates on the fluid catalyst principle and employs a microspherical catalyst. Construction economies have been achieved by combining the reactor and regenerator into a single unified column, by shortening the regenerator standpipe, and by eliminating the regenerator riser and all secondary catalyst recovery equipment. Yields of 45.5 to 53% of 400°F. end point debutanized motor gasoline are achieved when processing Mid-Continent gas oil on a once-through operation at 65% conversion. Clear octane rating of the product is as high as 82.1 (ASTM motor method) and 93 (research method). Lead susceptibility is 5.6 to 6.3 points with 3 cc. of TEL.

--Editor's Abstract

6. PETROLEUM

SYNTHETIC RUBBER

Ballew, W.M. SYNTHETIC RUBBER IN THE OIL INDUSTRY. *Oil Weekly* 120, 49-50 *(1945) December 3.*

Some effects that synthetic rubber will have on the petroleum world are discussed.

THERMAL CRACKING

Sung, H.C., Brown, G.G., and White, R.R. THERMAL CRACKING OF PETROLEUM. EFFECT OF TIME, TEMPERATURE, PRESSURE, AND TYPE OF CHARGING STOCK ON PRODUCTS. *Ind. Eng. Chem.* 37, *1153-1161 (1945) December.*

Experimental data on the thermal cracking of industrial combined-feed and virgin close-cut fractions have been obtained. The effect of time, temperature, pressure, and type of charging stock on the distribution and type of product and on the rates of the reactions involved has been evaluated from these results. Specific rates of reaction for the decomposition of the close-cut fractions for the production of gas and light distillate oils of various end points have been calculated. The specific polymerization rates of gas and gasoline have been determined, as well as qualitative information on the rate of formation of coke. The application of these data to commercial operations is indicated.

--Author's Abstract

7. ANALYTICAL METHOD AND TESTS

BUTADIENE - DETERMINATION

Elving, P.J. and Stein, T.L. AN IMPROVED GAS ABSORBER. APPLICATION TO DETERMINATION OF BUTADIENE. *Ind. Eng. Chem. Anal. Ed.* 17, 722-723 *(1945) November.*

An adsorber of the contact gas type is described, which can be used to determine butadiene in gaseous mixtures that are suitable for analysis by the Tropsch-Mattox or similar absorbers and is applicable to other methods of gas analysis where a minimum amount of reagent is to be used with efficient absorption.

--Author's Abstract

BUTADIENE - DETERMINATION

Gregg, C.L. APPARATUS AND PROCEDURE FOR TECHNICAL BUTADIENE ANALYSIS. *Ind. Eng. Chem. Anal. Ed.* 17, 728-730 *(1945) November.*

For the gas volumetric determination of butadiene with molten maleic anhydride, a bead-packed Hempel pipet type of absorber is used in place of the conventional U-tube absorber. This pipet type of absorber provides an apparatus much simpler and easier to manipulate and permits more rapid determination of butadiene. Accuracy equals that obtained with a U-tube adsorber when equilibration of reagent to gas is properly maintained. The factors affecting equilibrium between reagent and gas are discussed, and a procedure is described which conforms to the requirements of these factors.

--Author's Abstract

ETHYLENE - DETERMINATION

Francis, A.W. and Lukasiewicz, S.J. DETERMINATION OF ETHYLENE. *Ind. Eng. Chem. Anal. Ed.* 17, 703-704 *(1945) November.*

For the determination of ethylene, 22% mercuric sulfate in 22% sulfuric acid was found to be preferable to other absorption reagents because the absorption is irreversible, paraffins are not attacked and carbon monoxide and hydrogen are not absorbed. Carbon dioxide and olefins higher than ethylene are absorbed by the mercuric sulfate reagent and must be removed before the ethylene is to be determined. Comparing the analyses of samples of gas containing 2-30% ethylene by mass spectrograph and absorption into mercuric sulfate-sulfuric acid reagent shows the methods to differ by an average of 0.7% which is the order of uncertainty of the former method.

--F.L. Estes

8. GENERAL AND PHYSICAL CHEMISTRY

CARBON BLACK

Cohan, L,H. CARBON BLACK IN WAR AND PEACE. *Chem. Eng. News* 23, *2078-2085 (1945) November 25.*

A brief discussion is presented on carbon black before the impact of the war on the carbon black industry. Additional topics included are carbon black requirements of synthetic rubber, new plant construction and recent shortage of carbon black. The remainder of the article is devoted to a review of the fundamental nature of carbon black and its role in rubber reinforcement and the postwar prospects of the carbon black industry. The literature cited is an extensive bibliography of recent practical and fundamental developments in pigmentary blacks.

--S.W. Martin

CARBON MONOXIDE

Peck, C.E. (to Westinghouse Electric Co.) MANUFACTURE OF CARBON MONOXIDE. *U.S. 2,381,306 August 7, 1945.*

Hydrocarbon-containing gases are reacted with oxygen containing gases in the presence of a catalyst for producing a gas useful in metal heat treatment.

CORROSION

Corfield, G. CORROSION AND PROTECTION OF BURIED METALLIC STRUCTURES. CORROSION OF IRON BY BIOLOGICAL OXIDATION OF SULFUR AND SULFIDES. *Gas* 21, *47-48 (1945) December.*

Sulfur is distinctly labile when exposed to the action of bacterial enzymes for it may be oxidized readily by some of them, and in turn, its compounds are subject to ready reduction by others. During the course of change in either direction, oxidation or reduction, certain products are formed and these either directly or indirectly induce corrosion of iron or steel if the metal lies in close contact with the site of bacterial activity. In order that these enzymatic functions of the bacteria may progress, environmental conditions must permit appropriate physiological activity by the microorganisms concerned. These backgrounds of conditions vary since the requirements for reduction differ radically from those requisite for oxidation. Intense consideration has been devoted to the reduction of sulphates and other compounds of sulfur incorporating oxygen which give rise to hydrogen sulphide by microorganisms and the effects of this gas on submerged steel now are well recognized. The etiologic vibrios and the anacrobic surroundings necessary for their proliferation have been described in meticulous detail. Much less attention has been given to the opposite side of the picture, namely oxidation of sulfur and sulfides with subsequent formation of sulfuric acid. It is this area of activity which is discussed.

--Excerpt from article

8. GENERAL AND PHYSICAL CHEMISTRY

HYDROGEN-CARBON MONOXIDE MIXTURES

Sachsse, E. and Bartholome, E. (to I. G. Farbenindustrie A.G.). HYDROGEN-CARBON MONOXIDE MIXTURES. *Ger. 739,445, August 12, 1943*

Gaseous hydrocarbons are preheated to approximately 1000° or higher and are commingled with vapors of the iron group metals. The mixture is passed over stationary catalysts and incompletely burned with O in the presence of steam.

C.A. 39, 5440 (1945) November 20

HYDROGEN SULFIDE - REMOVAL

Hopton, G.U. and Griffith, R.H. REMOVAL OF HYDROGEN SULFIDE FROM FUEL GASES. *Gas J. 246, 809-813 (1945) December 5.*

The authors describe seven molecular forms of iron oxide examined as purifying agents for the removal of hydrogen sulfide from coal gas. Supporting tables summarize the outstanding physical properties of these oxides. While detailed work on the reactions of these oxides has been done before by both the authors as well as others, they attempted to explain certain features and disadvantages of the process. They discuss available materials and their identification and give a complete list of factors affecting the interaction of hydrogen sulfide and ferric oxide. It was interesting to note that the 3/8" diameter machine made tablets gave results in almost identical agreement as perfect spheres. While this is a continued article, the authors have a five point conclusion which adequately summarizes the experimental data for the reader.

--E.M. Rueck

9. ORGANIC CHEMISTRY

ALKYLATION

Clapetta, F.G. ALKYLATION OF ISOPARAFFINS. *Ind. Eng. Chem.* 37, *1210-1216 (1945) December.*

The literature on the catalytic reactions of paraffin and olefin hydrocarbons has been examined. The intramolecular hydrogenation-dehydrogenation properties of concentrated sulfuric acid were noted and led to suggesting the formation of a carbonium-ion intermediate during the alkylation, similar to that postulated by Whitmore for the polymerization reaction. The hydrocarbon products predicted by the carbonium-ion mechanism for the alkylation of isobutane with olefins are in good agreement with those found experimentally. Secondary products and certain reaction conditions are explainable on the basis of the mechanism.

--C.H. Riesz

ALKYLATION

Foster, A.L. COST FACTORS IN POSTWAR ALKYLATION. *Oil Gas J.* 44, *96-97 (1945) October 27.*

Alkylation of isoparaffins has been needed during the war for the production of aviation gasoline. It is a question whether this process will prove economical for motor gasoline. Data from actual plant operation in four cases are presented which give the requirements for utilities, charge stock, chemicals, labor, maintenance, supervision and overhead in anhydrous hydrofluoric acid operation. An estimate for post-war conditions is also given. Actual costs may be calculated from the data.

--C.H. Riesz

ALKYLATION

Shanley, W.B. and Nebeck, H.J. NUMEROUS IMPROVEMENTS IN HF ALKYLATION WILL CUT COSTS AND REDUCE LOSSES. *Oil Gas J.* 44, *94-98 (1945) December 1.*

Hydrofluoric acid alkylation has been in commercial usage only two years during a war time emergency. Experience gained in the operation of 28 plants has led to important improvements. Developments have shown that propylene may become an important feed stock which will also aid in improving the efficiency of the process.

--C.H. Riesz

CATALYST - DEHYDROGENATION

Wood, W.H. and Capell, R.G. BAUXITE... DEHYDROGENATION CATALYST FOR STYRENE PRODUCTION. *Ind. Eng. Chem.* 37, *1148-1152 (1945) December.*

Four naturally occurring bauxites (Alabama, Arkansas, Demerara and Suriname) and activated alumina were tested as catalysts for the dehydrogenation of ethyl benzene to styrene. Steam was employed as a diluent so that the partial pressure of ethylbenzene was about 65 mm. of mercury. At a constant temperature of 1200°F Suriname bauxite was superior to the others and gave an over-all yield of 40% styrene for 50 hours of continuous operation. With temperatures being continuously increased (up to a maximum of 1250°F) to maintain a constant yield of 40%, Alabama bauxite maintained this level of activity for 59 hours as compared with 48 hours

for Suriname bauxite. The other bauxites, as well as activiated alumina, appeared to have excessively long induction periods.

--C.H. Riesz

HYDROCARBONS - CATALYTIC CRACKING

Greensfelder, B.S., Voge, H.H., and Good, G.M. CATALYTIC CRACKING OF PURE HYDROCARBONS. *Ind. Eng. Chem.* 37, 1168-1176 (1945) December.

The cracking of twenty-two aromatic hydrocarbons over a silica-zirconia-alumina catalyst is reported. A wide range of behavior is observed, from nearly inert compounds like toluene or biphenyl to highly reactive ones such as aromatics with substitutent alkyl or cycloalkyl groups containing three or more carbon atoms, for which the removal of the whole substituent group is the chief cracking reaction. Results from catalytic cracking of the various hydrocarbon classes are reviewed. The stability of compounds of a given carbon number in processing over the cracking catalyst increases in the order: olefins, aromatics with C_3 or larger substitutent groups, naphthenes, polymethyl aromatics, paraffins, and unsubstituted aromatics. This order differs substantially from that found in thermal cracking.

--Author's Abstract

10. DEVELOPMENT ENGINEERING

COAL

Wol, E.F. and Von Hohenleiten, H.L. EXPERIMENTAL STUDY OF THE FLOW OF COAL IN CHUTES AT RIVERSIDE GENERATING STATION. *Trans. Am. Soc. Mech. Eng.* 67, 585-599 *(1945) October.*

The effect of moisture content, degree of compacting and uniformity coefficient of coal upon rat-holing, arching and sticking in chutes is discussed. Relations between (a) static angle of repose and % moisture in loose and in fully compacted coal, (b) density and % moisture (c) static angle of repose and density (d) dynamic angle of repose and % moisture (e) angle of slide for different materials (and shapes and % moisture are shown for the particular coal studied. The following points on chute design are given: (a) use shortest possible path (b) use tapered or uniformly enlarging round chutes (c) make angles of chutes as steep as possible (d) keep reductions in cross section down to a minimum. The greater the taper of side of cone (in. / ft. of height) the smaller the moisture content allowable to prevent sticking in pipe. (There is a tendency to compact the coal by a powerful wedge action whenever the ratio of the length to the smallest diameter exceeds approximately 2). (e) avoid the smallest restrictions. Consideration is paid to the problem of bringing together 2 streams of coal. The problem of maintaining uninterrupted flow of coal from bunker to chutes is now under investigation.

--J. First

CONDENSERS

Bureau, A.C. THE DESIGN AND PERFORMANCE OF WATER TUBE CONDENSERS. *Gas Times* 45, *Suppl. 2-8 (1945) November 24.*

Some heat transfer data and a procedure for design are given for the cooling of air by water in a tubular condenser. The water is to be used in the tubes.

--J.D. Parent

COOLING COILS

Marshall, G.K. SELECTION OF COOLING COILS. *Heating & Ventilating* 42, *82-87 (1945) November.*

A rational method of designing a finned coil for cooling air is presented. Several graphs to facilitate the use of the method are given.

--J.D. Parent

CORROSION PREVENTION

Barnes, K.B. and Deegan, C.J. CORROSION INHIBITOR. *Oil Gas J.* 44, *84-86 (1945) October 27.*

Hydrogen sulfide corrosion in an oil well may be inhibited by the following chemicals: Potassium cyanide, carbon monoxide, and formaldehyde. The latter is the most effective and also practical. In field tests it is 100% effective against corrosion. One quart per day of formaldehyde (standard commercial grade) per 25 bbl. daily production of salt water is sufficient. The cost of this would be approximately one third of a cent per barrel of oil produced, A thin film of formaldehyde probably is

formed on the steel. This film is effective from 24 to 48 hours, with the inhibition action possibly decreasing thereafter. An unpleasant odor somewhat like mercaptans is noticed with this film. The corrosive action takes place only in presence of water. Once started, it increases in severity since sulfur corrosion acts in a combined effect with electrolytic corrosion.

--S. Mori

HIGH TEMPERATURE ALLOYS

IMPORTANT HIGH TEMPERATURE MATERIALS. *Oil Gas J.* 44, 101 (1945) *December 8.*

High-temperature alloys used in petroleum refining equipment are listed in table form, together with composition, high-temperature properties, and chief fields of use.

SMOKELESS LOCOMOTIVE

RAILROADS STOP SMOKE WITH BCR JETS. *Bituminous Coal Research* 5, 1-2 (1945) *October-December.*

A demonstration of smokeless coal-burning locomotives was held in Columbus, Ohio on October 16 at the annual meeting of the Smoke Prevention Association of America. The smoke eliminators were the products of BCR research at Battelle. The devices combine air-induction tubes fastened into the furnace wall, 1/8 in. steam nozzles for injecting outside air into the fireboxes, and the all important silencers. 666 engines on 24 railroads are now equipped with the smoke eliminators.

--Excerpt from article

TEMPERATURE MEASUREMENT

Krogh, A.E. THERMOCOUPLES. *Gas* 21, 35-38 (1945) *December.*

Many industrial and technical temperature measurements, and most of those at high temperature levels, depend primarily on the thermocouple as the basic measuring element. A thermocouple is essentially a junction between two dissimilar metals, which junction produces an electromotive force proportional to the temperature to which it is subjected, and which electromotive force is measured and interpreted in terms of temperature. The thermocouple is an accurate and dependable device, but only when it is properly selected for the particular service required, and properly installed and protected. The various types of thermocouples available, their uses and limitations, and practical application to various industrial measurement problems are described in detail in this article by Mr. Krogh, which was first in "Instrument Applications" published by the Brown Instrument Company.

--Editor's Abstract

TURBINE, COAL-FIRED

YELLOTT PLANS COAL-FIRED TURBINE. *Bituminous Coal Research* 5, 8, (1945) *October-December.*

In Progress Report No. 1 to the BCR Locomotive Development Committee, J.I. Yellott outlined a proposed experimental arrangement for a coal-burning gas turbine. The most promising motive power, he believes, is the gas turbine, driven by heated air and combustion products from pulverized coal burned under pressure. The experimental work has been divided into several projects and assigned to established laboratories. Battelle is at work on the combustion of coal under pressure. Also, a small turbine will be operated on the gases within a few months. The John Hopkins University is developing the coal atomizer and will build and operate a complete coal-handling system, to simulate operation on the locomotive. The Institute of Gas Technology is working on four projects for the LDC--the feeding of coal against pressure, preheating coal before ignition, fly-ash separation, and a theoretical study of gas-turbine cycles.

--Excerpt from article

II. CHEMICAL ENGINEERING

CONTINUOUS FLOW

Hulburt, H.M. CHEMICAL REACTIONS IN CONTINUOUS FLOW SYSTEMS. *Ind. Eng. Chem.* 37, *1063-1069 (1945) November.*

Starting with several fundamental expressions, namely: The law of conservation of matter, Feck's law, and an expression for accumulation rate due to both reaction and diffusion, kinetic equations are derived for mixtures flowing through cylinders whose walls are catalytically active. Formulas for estimating the influence of diffusivity on yield are given. Pelleted catalysts and catalyst poisoning are discussed.

—J.D. Parent

FLUID FLOW

Buthod, P. and Whiteley, B.W. PRACTICAL PETROLEUM ENGINEERING. *Oil Gas J.* 44, *104-105 (1945) October 27.*

Two graphs are presented. One is for the estimation of pipe roughness, which is important in the turbulent range; the other is the usual plot of Fanning friction factor vs. Reynolds number. In the second graph pipe roughness is used as a parameter.

—J.D. Parent

FLUID FLOW

Buthod, P. and Whiteley, B.W. PRACTICAL PETROLEUM ENGINEERING, *Oil & Gas J.* 44, *76-81 (1945) December 1.*

Two charts useful in evaluating Reynolds numbers for hydrocarbon gases are presented.

—J.D. Parent

FLUID FLOW

Buthod, P. and Whiteley, B.W. PRACTICAL PETROLEUM ENGINEERING. *Oil Gas J.* 44, *92 (1945) December 8.*

Using the law of conservation of energy, the equation of continuity and the ideal gas law corrected by the inclusion of the compressibility factor, an expression is derived for flow-rate in terms of pipe diameter and length, specific gravity, temperature, compressibility factor up and downstream pressures of the gas, and the friction factor. Two charts are provided for the graphical solution of the equation which should be good for the transmission of gases at high pressures.

—J.D. Parent

FLUID FLOW

Buthod, P. and Whiteley, B.W. GRAPHIC SOLUTIONS OF DESIGN PROBLEMS. *Oil Gas J.* 44, *70-72 (1945) December 22.*

A plot is presented for the graphical solutions of the problem of finding the pressure drop which may be expected to attend the flow of a gas through vertical or inclined pipes. The equation of continuity, the gas law using the compressibility factor and Bermouilli's Theorem are used in deriving the final expression which is to be solved. The kinetic

energy term is neglected in the Bermouilli equation but the potential term is rejected. This latter term would be significant in deep wells.

--J.D. Parent

GAS FLOW

Miller, B. A SIMPLE METHOD OF ALLOWING FOR CHANGE IN ELEVATION WHEN CALCULATING GAS FLOW IN PIPE LINES. *Gas Age* 96, 39-41 *(1945) December 13.*

An accurate formula, which is essentially that proposed by Ferguson in *Gas Age Record and Natural Gas July 11 & 18, 1936* for calculating gas flow in pipe lines where there is a notable change in elevation, is simplified by introducing approximations.

--J.D. Parent

GAS FLOW

Hiles, J. and Mott, R.A. THE FLOW OF GASES THROUGH BEDS OF COKE AND OTHER GRANULAR MATERIALS. *Fuel in Science and Practice* 24, 135-142 *(1945) September-October.*

The work of Furnas on the resistance of beds of broken solids to the passage of gas (Bull, 307, U.S. Bureau of Mines, 1929) is reviewed and critically evaluated. The work of certain other authors is also mentioned, particularly, the contributions of Fehling (Feuerungstechnik 33, 27 (1939) and Fehling and Rosin (Trans. Inst. Chem. Eng. 15, 178 (1937). Tests on coke of ¼" to 3" diameter in a furnace of 8" I.D. using bed depths of 6", 12" and 16" are reported. The influence of particle size and voidage are discussed, but final conclusions as well as further discussions are to be published in a second installment. The general form $h/l = \frac{KV^n}{d^m}$ is suggested, where $\frac{h}{l}$ is the head loss per unit height of bed, V is the gas velocity, d is the particle diameter while m and n are empirical constants. K is a rather complex function of particle shape and packing effects.

--J.D. Parent

THERMODYNAMICS

Edmister, W.C. HYDROCARBON THERMODYNAMICS. *Calif. Oil World* 38, 11-30 *(1945) November.*

This is the first of a set of articles on the elements of thermodynamics as applied to hydrocarbons. The author points out that thermodynamics is useful for the following types of calculations: (1) combustion, including furnaces and regeneration cycles; (2) heat balances, including vaporization, condensation, distillation and reaction heats; (3) power, including pumping and turbine problems; (4) phase equilibria; and (5) chemical reaction equilibria. The method of the thermodynamicist is to obtain and correlate experimental data. Derived thermodynamic properties are next evaluated. The last and most important step is to apply the data to particular problems. Basic equations are given without deviation and some fundamental terms are briefly explained. A number of examples of correlation are given; these are primarily in terms of reduced properties.

--J.D. Parent

Abstractor's Note:

There are two points which should be more rigorously treated. Work is not equal to Spdv except when it is realized in a reversible or frictionless process. Further, in calculating entropy changes the heat effect which is to be divided by the absolute temperature is that of a reversible process and not of any irreversible process.

THERMODYNAMICS

Edmister, W.C. HYDROCARBON THERMODYNAMICS. *California Oil World* 38, 17-29 *(1945) December.*

This is the second and final installment of a pair of articles which states the usefulness of thermodynamics in calculations relating to hydrocarbon chemistry. A number of useful charts are presented and a good bibliography is given.

--J.D. Parent

12. APPARATUS AND EQUIPMENT

DUST SEPARATOR

Van Tongeren, H. CENTRIFUGAL DUST SEPARATOR. *U.S. 2,378,600 June 19, 1945.*

This patent takes cognizance of the double eddy produced in annular space of cyclone. Whereas in earlier patents the upwardly directed current was conducted in a by-pass line to a lower section of the chamber the method proposed here is to cut a spiral groove in the wall for conducting rejected solids from the top of the chamber to a point below the central plane of the double eddy.

--J.D. Parent

ROTAMETERS

Beckett, W.J. ROTAMETERS. *Southern California Meter Association Publication No. 22, (1945) May 17.*

This is a clear, concise and quite complete exposition of the construction and operational characteristics of rotameters. It should be read by all who are not familiar with the instrument.

--J.D. Parent

13. NEW BOOKS

Altieri, V.J. GAS ANALYSIS AND TESTING OF GAS MATERIALS. *New York, Amer. Gas Assoc., 1945.*

This treatise is a comprehensive book of standards on gas analysis and testing of gaseous materials. Its thorough index gives a bird's eye view of each subject instantly enabling the reader to find essential principles, methods, specifications, tests, interpretations and related matters. It correlates information widely scattered throughout the technical literature together with hitherto unpublished information generously contributed by contemporary workers in many scientific and technologic fields.

Excerpt from foreword by
E.L. Sweeney, Chairman
Committee on Revision of the
"Gas Chemists' Handbook"

Eckman, D.P. PRINCIPLES OF INDUSTRIAL PROCESS CONTROL. *New York, John Wiley & Sons, Inc., 1945.*

This is an excellent elementary treatment of the subject of automatic control. All explanations and drawings should be comprehensible to the amateur. Control theory, quality and applications are discussed. Some common installations are given in a very interesting manner.

--J.D. Parent

S.M. Mc Elvain. THE CHARACTERIZATION OF ORGANIC COMPOUNDS, *New York, The Macmillan Company, 1945.*

This elementary text was prepared from lectures given at the University of Wisconsin. The subject is treated in the usual textbook manner, covering the determination of physical constants, analysis for S, N, and halogens, solubilities, class reactions and the preparation of derivatives. The discussion of solubility and of class reaction is very comprehensive and contains frequent references to recent literature.

--F.L. Estes

(BRITISH) National Federation of Gas Coke Associations; British Hard Coke Association; The South Wales Anthracite and Dry Coal Committee. PRODUCER GAS PLANT FOR INDUSTRIAL PURPOSE. ITS OPERATION AND MAINTENANCE. *Published by the joint committee, London, 1942.*

The book has chapters on Gas Production; Gas Generator; Washer-Coolers and Filters; Fans; Boosters and Gas Pressure Control; Plant Control Instruments and the Analysis of Gas; Sulfur Removal; Utilization of Producer Gas; and Typical Producer Gas Plants.

Pollard, E. and Davidson, W.L., Jr. APPLIED NUCLEAR PHYSICS. *New York, John Wiley & Sons, 1942.*

PERIODICALS ABSTRACTED FOR GAS ABSTRACTS

AMERICAN ASSOCIATION FOR ADVANCEMENT OF SCIENCE BULLETIN

AMERICAN GAS ASSOCIATION MONTHLY

AMERICAN GAS JOURNAL

AMERICAN PETROLEUM INSTITUTE QUARTERLY

AMERICAN SOCIETY FOR TESTING MATERIALS BULLETIN

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BERICHTE DER DEUTSCHEN CHEMISCHEN GESELLSCHAFT

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BLAST FURNACE AND STEEL PLANT

BRAUNKOHLE *(Microfilm)*

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CHIMIE ET INDUSTRIE *(Microfilm)*

COKE AND SMOKELESS FUEL AGE

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INDUSTRIAL AND ENGINEERING CHEMISTRY: ANALYTICAL EDITION

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INDUSTRIAL BULLETIN OF ARTHUR D. LITTLE, INC.

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JOURNAL OF CHEMICAL EDUCATION

JOURNAL OF CHEMICAL PHYSICS

JOURNAL OF CHEMICAL SOCIETY (LONDON)

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